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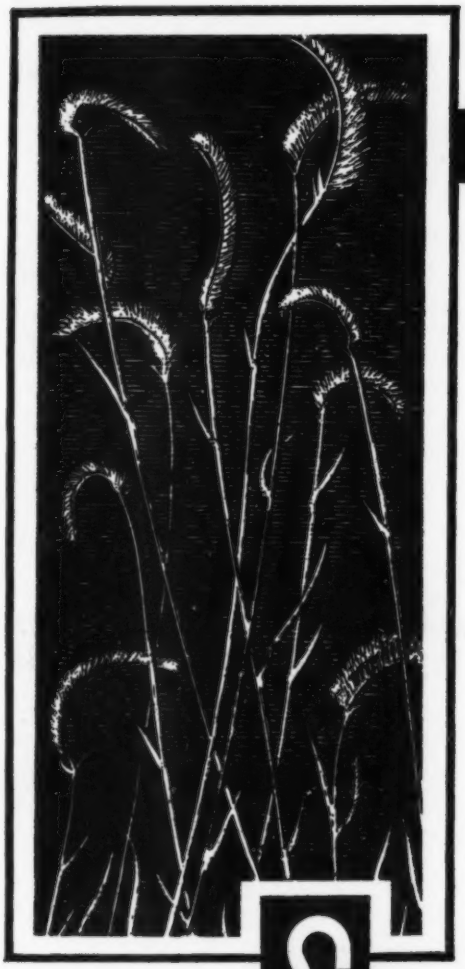

SEPTEMBER 1941

Presenting

Land and People

Footprints in His Fields

Rains on the Plains

SOIL CONSERVATION

OFFICIAL ORGAN OF THE SOIL CONSERVATION SERVICE

The Chief of the Soil Conservation Service is also one of the country's ablest agricultural news reporters. Go with him (start at page 71), as he makes a wide swing through Iowa, Arkansas, and Texas.

UNITED STATES DEPARTMENT OF AGRICULTURE – WASHINGTON

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WELLINGTON BRINK
EDITOR

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SOIL CONSERVATION

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HUGH H. BENNETT
Chief, Soil Conservation Service

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Thousands of kudzu seedlings for erosion control in the Southeast. An aerial photograph of part of the Soil Conservation Service nursery at Rock Hill, S. C.

Zero to Thirty Million Mile-a-Minute Seedlings

By PAUL TABOR and ARTHUR W. SUSOTT [1]

TODAY, Soil Conservation Service nurseries in the Southeast produce millions of kudzu seedlings annually. These are distributed in limited quantities among farmers cooperating with soil conservation districts so that they can establish good beginning stands of kudzu. Once a good stand is established the crowns can be used in expanding acreages.

Trial plantings under varied conditions and constant observation and study during the past few years have enabled personnel of the Service nurseries to improve methods of growing seedlings, and thereby speed up production. Commercial growers also grow far more seedlings and hundreds of farmers have found it profitable to sell crowns from the stands of kudzu they have established.

Generally speaking, kudzu's chief use in the Southeast back in 1934 was as a shade or ornamental plant

[1] Assistant chief, regional nursery division, and chief of regional division of information, respectively, Southeastern Region, Soil Conservation Service, Spartanburg, S. C.

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During November, L. B. Scott, chief of the Service's southeastern regional nursery division, figures out the distribution to be made of kudzu seedlings. By that time predigging estimates have given Mr. Scott a good idea of the size of the current seedling crop. Allotments are based on the size of the seedling crop and the number of requests for seedlings. Area and district conservationists of the Service supervise the distribution to farmers in soil conservation districts.

around the home. Soil Conservation Service workers were certain, however, that kudzu had a definite place on the southeastern farm. They knew it would check erosion, even on badly eroded steep land, and once established would provide the farmer with a dependable source of first-class hay. Within the short span of 6 years, southeastern farmers have developed a genuine appreciation of kudzu and Service nurseries have made noteworthy progress in meeting the farmer demand for seedlings.

In many sections of the Southeast, farmers now call kudzu the "porch," "mile-a-minute," or "telephone" vine, or the "thunder 'n lightning" plant. Many Negro farmers just refer to it as "the vine." Kudzu runners often grow 50 feet long in a single season.

An idea of the widespread farmer acceptance of kudzu can be gained from the number of seedlings distributed by Soil Conservation Service nurseries during the past 6 years. This past planting season the nurseries supplied more than 30 million seedlings to farmers in 82 soil conservation districts in the Southeast—enough to plant 60,000 acres. The previous year 23 million seedlings were produced, and in 1938 a total of 13 million. During 1937, the nurseries raised 4½ million, but none at all in 1936 as seed could not be obtained. A total of 600,000 seedlings were grown during 1935. All told, more than 73 million seedlings have been produced by the nurseries during the past 6 years.

During the past planting season—January to April—the demand for kudzu seedlings was so heavy that by February most commercial nurseries and private growers reported their seedlings "sold out." Many farmers, however, expanded their kudzu acreage by planting crowns dug from kudzu stands already established; or if they did not have stands, they bought crowns from neighbors. Some farmers realized as high as $100 an acre from the sale of crowns which sold at $5 to $7 per thousand.

In spite of increased production by Service nurseries, greater output by commercial nurseries and private growers, and the number of crowns that can be dug from established stands of kudzu, there appears to be no immediate probability of reaching the saturation point in seedling production. Too many acres of eroded farm land in the Southeast still are badly in need of permanent vegetation such as kudzu. Moreover, there are thousands of farms that would benefit by including kudzu in the cropping system to provide an additional source of hay or forage. Raising enough feed for livestock is still a serious problem on many farms in the Southeast.

As a matter of fact it would require years to produce sufficient seedlings for all the farm land in the Southeast that might be suitably and advantageously planted to kudzu. The magnitude of such an undertaking looms more clearly if considered from the standpoint of a fraction of the job ahead in soil conservation districts in the Southeast. These districts have a total land area of approximately 100 million acres, and more are being organized. Presuming that Service nurseries continue to produce enough seedlings to plant 60,000 acres annually it will require almost 14 years to grow enough seedlings to plant one out of every 100 acres in the districts already organized.

As it turns out, however, the job of the Soil Conservation Service nurseries is not merely a matter of producing seedlings sufficient for planting 1 or 2 acres out of every 100 acres in districts. The complete conservation plans being developed for farms in most of the districts call for more. Even on small-sized farms—say about 40 acres—the conservation plan often provides 4 or 5 acres of kudzu.

After kudzu seedlings have been pulled from ground, they are graded and tied into bundles of 25 each. Loose root ends have been trimmed from the two bundles held by the CCC enrollee, at right, to facilitate planting.

The total production of 73,300,000 seedlings by Service nurseries was sufficient for planting 146,600 acres, although not all of the plants survived. Today, survival is much better, as techniques for planting and care have been improved and farmers are showing a greater interest in obtaining good stands of kudzu and maintaining them. R. Y. Bailey, regional agronomist of the Soil Conservation Service, estimates that approximately 120,000 acres of kudzu have been established in demonstration areas and districts from seedlings supplied by the nurseries. In addition, many more acres of kudzu were established, with seedlings obtained from private growers or with crowns.

Weeds are carefully removed from young seedlings in Service nurseries, to insure rapid and healthy growth.

It is significant to note that of the 120,000 acres established, 60,000 acres, nearly half the total, were planted the spring of 1941. This reflects the constant increase in the demand for seedlings and the steps taken to meet this demand. In Clay County, Ala., farmers cooperating with the SCS-CCC-camp demonstration program planted 2,600 acres during the past 5 years. This past year the farmers in Clay County were scheduled to plant 3,000 acres as part of the conservation program of the Piedmont Soil Conservation District, which embraces Clay County. Here and there throughout the Southeast similar increases are reported.

Along with the steady increase in nursery seedling production, improvement in the technique of producing the seedlings has been noteworthy. Six years ago the immediate problem at hand was to produce kudzu seedlings in large quantities so that kudzu could do a good job of controlling erosion and producing forage that is sorely needed in the Southeast. Crowns of kudzu plants could be utilized, but they could not be produced in large quantities as readily as seedlings. Vine cuttings had been tried, but this method was not entirely satisfactory. It was apparent that kudzu seed was needed.

Approximately 350 pounds of seed were obtained from Japan for sowing during 1935 in trial plantings on a nursery plot at the Dadeville, Ala., demonstration project and at Service nurseries at Fairhope and Atmore in the same State. The seed produced 600,000 seedlings which were transplanted on farms in erosion-control demonstration areas with good results. More seedlings were requested by farmers for the next planting season, but in 1936 no seed could be obtained. However, seed from Japan became available again for the 1937 planting season and 4½ million seedlings

were produced. In the succeeding years more and more seed was bought from Japan for nursery use.

Visitors to the Soil Conservation Service nurseries frequently ask why the nurseries do not produce their own seed. At present, it is explained, the nurseries find it less expensive to buy seed from Japan, where climatic conditions are more favorable for the production of good viable seed in large quantities. Then, too, considerable experimental work remains to be done in the Southeast before satisfactory methods of seed production can be developed. One requirement for growing seed seems to be that kudzu must grow upright. Seed pods seldom appear on kudzu growing flat on the ground in open fields, but plants growing upright in gullies or climbing on small trees or bushes have a tendency to produce seed.

Service nurseries are not overlooking the possibilities of local seed production, especially in view of the present uncertainty of foreign sources. Experiments in which the Bureau of Plant Industry is assisting are under way at the Soil Conservation Service nurseries at Rock Hill, S. C., and Thorsby, Ala. Climate is among the various factors that has to be considered, says L. B. Scott, chief of the regional nursery division, as moisture conditions during the growing season seem to have considerable influence on the quantity of seed produced. Observations indicate that more seed is produced during summers having more than average rainfall. Methods of storing seed to ensure greater viability also are being studied at the nurseries.

The seed for seedling production is treated carefully to ensure good germination. Kudzu seeds have thick, impervious coats, but after going through scarifying machines they absorb ground moisture easily after planting. Tests were begun in 1940, in cooperation with the Bureau of Plant Industry, with hormone material and decay-preventing dusts, to develop treatments to help stimulate early growth of seedlings and protect weak seeds against decay.

As a result of field trials and improvement in methods of growing seedlings, the seeding rate at the nurseries has been reduced until now only 12 to 15 pounds are planted to an acre. During early operation of the nurseries the rate of seeding ran as high as 100 pounds an acre. Under favorable growing conditions, a good stand of young kudzu seeded at the rate of 12 to 15 pounds an acre will produce 100,000 seedlings an acre.

May and June appear to be the best months for planting the seed. The average daily temperature should be above 65° F., and the soil moist. Lack of moisture often results in poor stands, and for that reason practically all of the seed is planted before July. Soils in the Southeast have plenty of the proper bacteria, so that the seed does not require artificial inoculation.

The seedlings can be grown in either narrow or wide rows. For most part those in the nurseries are grown in uniformly spaced pairs of double rows to facilitate cultivation and use of the machinery that lifts the plants when they are ready for transplanting. The double rows are 8 to 10 inches apart and the middle between the double rows about 20 inches. On each side of two sets of double rows are wider middles—30 to 34 inches—which serve as pathways for the wheels of tractors and lifting machinery.

Trials and experience at the nurseries have shown that satisfactory seedlings can be produced without commercial fertilizers on soils with mineral content sufficient to produce 25 or more bushels of corn per acre. On poorer soils a complete fertilizer is needed. Weeds easily stunt the growth of young plants, and frequent cultivation is necessary. When plants have suffered seriously from stunting, side dressings of commercial fertilizer are applied.

The seedlings are not removed from the nursery beds until they are dormant. An extended drought may induce dormancy before the vines are killed by cold weather, but even so it is best to wait until the vines are dead and thoroughly dry. The job of removing the seedlings has to be done carefully so that as few as possible of the plants are split or broken. The first step is to cut away the excessive vine growth; then a lifting machine with a strong sharp blade is run about 10 inches beneath the rows to cut the roots at a safe depth and loosen the soil. The plants are then carefully pulled out by hand, graded, and tied into bundles of 25 each.

The life of a kudzu seedling after it is removed from the nursery bed depends greatly on the quantity of plant food stored in its roots. For this reason only those seedlings with one or more roots as large as an ordinary lead pencil are selected as suitable for transplanting. The split or badly bruised seedlings are given time to heal before being regraded.

The seedlings, after they are lifted from the nursery, are stored at various SCS-CCC camps in the southeastern region of the Service so that distribution to farmers in soil conservation districts can be handled with ease and efficiency. At CCC camps the seedlings are "heeled in" in well-drained trenches: sand is packed firmly around the plants and more is added on top to form a protective covering at least 6 inches thick. Further protection against cold weather is provided by placing pine needles, pine brush, or roofing material on top of the trenches. During February and

March the seedlings are distributed from the CCC camps to farmers cooperating with soil conservation districts. Planting on the farms is completed during March and April.

Six years ago fields of kudzu were few and far between in the Southeast, but today this plant is no longer a stranger on the farm. In addition to the 120,000 acres established in districts and demonstration areas from seedlings supplied by the Soil Conservation Service nurseries, the region has hundreds of other good stands that have been established during the past 6 years—many of them the direct result of farmers' visits to demonstration areas.

In the beginning, many farmers were skeptical about kudzu, as it was relatively new to them. Among the stories they had heard was that kudzu might become a pest difficult to control and that harvesting hay was quite a laborious and complicated task. Technicians assisting in the demonstrations pointed out that kudzu can easily be eradicated by overgrazing; and harvesting demonstrations have shown that by the use of a simple attachment on the mowing machine cutter bar, kudzu is easy to cut as hay in spite of its viney growth. Today, kudzu is seldom regarded as a pest, and farmers are taking care against overgrazing.

Farmers have learned also that with proper care and attention kudzu will thrive on badly eroded or waste land. As a feed for livestock, kudzu is highly palatable and ranks with alfalfa in nutrient value. During periods of drought when pastures fail, a field of kudzu serves admirably as a temporary pasture.

Experience of southeastern farmers shows that kudzu is an excellent crop for increasing soil fertility. In field experiments in Alabama kudzu increased the yields of corn approximately 20 bushels an acre on land that in most instances had been abandoned for cultivation. Agronomists of the Soil Conservation Service predict that kudzu will be used in rotations on millions of acres of badly eroded cropland.

The prospects of obtaining more seed from Japan or other foreign sources have been dimmed somewhat by recent world events. Even so, should seed become scarce, the Southeast now has thousands of acres of well-established kudzu from which farmers can obtain crowns for use as planting stock. Meantime, as work of the Service nurseries and other plant growers progresses it is not unlikely that ways and means may be worked out in this region for the local production of seed in large quantities.

BANKERS PUT CASH VALUE ON CONSERVATION PROGRAM

By A. E. McCLYMONDS[1]

NEBRASKA mortgage bankers have put a cash value on soil and moisture conservation—a substantial value that maintains nearly identical ratios on the more valuable lands and those of lower value.

This is important, since most of us are prone to judge the worth of many things on the basis of whether or not we can afford them. The implication of the bankers' appraisal is that a farmer cannot afford to be without a good conservation program.

Representatives of the Nebraska Mortgage Bankers' Association made the appraisal late in May during the course of their annual meeting at Lincoln, when the members made a tour to Pawnee City, headquarters of the Turkey Creek Soil Conservation District.[2] They were armed with land-use capability maps based on the physical conditions of the soil, slope, and erosion, which had been prepared by Soil Conservation Service technicians.

The appraisers evaluated two 160-acre farms, across the road from each other. One, Frank Kalina's, has planned for it a complete conservation program, and some of the practices already are established. The other, Frank Mort's, is without a conservation program.

On the basis of similar places, the bankers set the present sale value of Kalina's farm at $4,800; without the conservation program they would have put the figure at slightly under $3,200. They estimated the present sale value of Mort's place at slightly less than $2,000, and concluded that the addition of conservation practices would raise this by $760.

Loan value appraisals are particularly interesting. The bankers set the loan value of Kalina's farm, if without conservation practices, at $691 and decided that after 10 years of farming without a conservation program this figure would drop more than a third—to $410 by 1951. As it is, they placed the present loan value at $2,200, and the 1951 loan value at $2,450 if the conservation program is continued.

[1] Regional conservator, Northern Great Plains Region, Soil Conservation Service, Lincoln, Nebr.

[2] See *Of the Farmers, By the Farmers and For the Farmers*, by A. E. McClymonds. Soil Conservation, February–March, 1941.

They placed the present loan value of the Mort farm at $229 and estimated this would drop to $133 by 1951 as a result of nonconservation operations during the intervening decade. On the other hand, the appraisers decided that if Mort had a conservation plan in operation the present loan value would be $670, with an increase by 1951, after 10 years of conservation practices, to $975.

Aside from evaluating the Kalina farm on the basis of conservation and nonconservation operations, some of the bankers also expressed their opinions on the human element. These men said they would feel justified in lending more on the farm if Kalina stayed there than if he moved away so that the prospect would involve less permanency of occupancy and operators. Stabilizing people on the land is important, too, is their view.

Before the appraisers went out on the job, the association heard speakers from the Nebraska College of Agriculture, the Extension Service, and the Soil Conservation Service; and they had gone on a tour to see some of the work that had been done. Thus the men selected for the appraisal had a clear idea of what the various conservation practices are doing in the way of stabilizing and even raising the productivity of farm lands. Productivity is, after all, the security for the loans offered by the association members.

This appraisal by disinterested persons of the job the United States Department of Agriculture has undertaken—the job of helping farmers to get on a firm footing and to stay there—is significant, particularly in view of the fact that a strong agriculture is the backbone of national defense at all times.

The farmers of Pawnee County, for the most part, are livestock feeders who derive their principal income from cattle and hogs, staple commodities that are especially in demand in these troublous times. By maintaining their credit base—and the bankers' appraisal indicates that they feel that conservation practices help to do this—the farmers are in a position to produce more and better crops and stock for the welfare of the Nation.

Substantiating the judgment of the appraisers, representatives of five insurance companies went to the Turkey Creek Soil Conservation District office to ask about conservation practices and how to apply them on lands their companies have had to take over. They, too, wish to protect assets.

Wanted: Technical Assistance Only

By F. E. Charles

WHOEVER wrote the "rain in cherry blossom lane" song must sometime have been in Michigan's famous cherry country—in beautiful Leelanau County, "land of delight," in Indian language—or in Grand Traverse County where the tourist business vies for leadership with fruit culture.

Interwoven with the story of this land of sweet and sour cherries is the story of how farms bordering picturesque Grand Traverse Bay have lost their soil—and how landowners there now have learned to hold it. The countryside is idyllic. In winter, snow settles over the landscape. When spring breaks, cherry trees covering hill and vale blossom in banks of pink and white. When summer slips in on southerly breezes, the undulating hills turn crimson, as farmers direct small hordes of migratory "pickers" to the harvest.

Only a few years ago these Michigan cherry farmers were clean-cultivating their orchards. They thought they had to. Like the Corn Belt farmer who took pride in straight rows, here, too, neighbors envied the man who could say "There isn't a weed in my orchard."

Then, abruptly they changed their system. Their steep, sandy, erodible soils now lie most of the time beneath blankets of green cover.

In 1936, only 131 acres of cover crops were grown in all Grand Traverse County. During the next couple of years farmers began to revise their thinking: Records for 1939 show 3,866 acres of cover; 10,000 acres a year later; 7,000 acres, a "very conservative" estimate according to County Agent Carl Hemstreet, actually were seeded in orchards and fields within the year.

A combination of reasons accounts for this increased use of cover crops. Carl Hemstreet has advocated soil-building practices since 1935. The Triple-A program resulted in more cover and green-manure crops. Land taken out of production was sown to meadow—thousands of acres to that magnificent Michigan combination of alfalfa and bromegrass.

It was in March 1936 that Hemstreet first called together twenty-odd members of his county land-use planning committee. Among other things regarded as essential by these leading farmers was control of soil erosion. They thought some intelligent land-use planning was needed, but they didn't think such planning was practical without basic information on all lands within the county. Such data were obtained in a survey made by J. O. Veatch of Michigan State College,

Proof that the wind sweeps the sandy soil from exposed areas, uncovering the roots of heavy investments, cherry trees.

giving these Grand Traverse farmers a chance to divide their land into areas suitable to agriculture, forestry, and recreational purposes.

The survey, and subsequent study of the data by intelligent farmers, emphasized the fact that Grand Traverse was losing a lot of its best topsoil. Cover crops were advocated as one remedy.

Another factor was something the county land-use committee had to work to get—a soil erosion control demonstration area of the United States Department of Agriculture. Grand Traverse farmers had been hearing about such an area in the Benton Harbor fruit

This is the sort of landscape to be reforested by the South Muskegon soil conservation district. Studying this example of cutting are Carl Knopf, county agent; Vic Anderson, secretary-treasurer of the district directors; William S. Ufer, district conservationist, and Olaf Hostad, chairman of district directors.

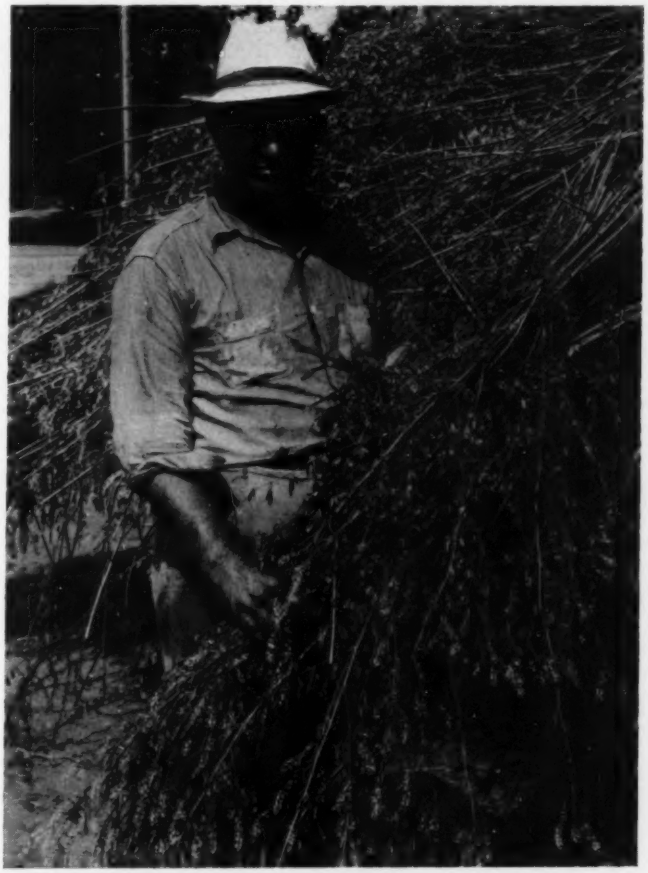
Roy Hooper is chairman of the county agricultural planning committee at Grand Traverse. None fights harder for community cooperation, and none grows finer cherries.

section and another near Howell. But these areas were 200 miles down-State—farmers could not see the demonstrations at that distance. They petitioned the Secretary of Agriculture to set up erosion-control demonstrations somewhere in the upper end of the lower peninsula. That was in the winter of 1938–39. By spring of 1939 the Soil Conservation Service made available to them two trained soil-conservation farm planners. Three areas in Grand Traverse County were selected as "typical" of erosion problems in that end of the peninsula.

One was the Acme area, lying east of Grand Traverse Bay, where farmers are gradually shifting from general farming to fruit. A second area chosen for demonstrations was the Old Mission Peninsula which juts into Traverse Bay and is richly endowed with soil and climate suitable to cherry growing. A third area of more general farming lies farther inland, in the southwestern corner of the county.

When seeking assistance in planning their farms for soil conservation, these farmers made it plain that they were not asking for donations of materials and labor. They asked only for guidance. Guidance is what they got and they have followed it to the letter. Even as recently as 1939, many Grand Traverse orchards were cultivated "clean as a whistle"—Peninsula Township does not look like the same place now, the orchards are so completely protected with alternate middles of sweetclover and Sudan grass.

Lee Rosencrans, head man for the soil-conservation project, took me all over the peninsula. We stopped and talked with farmers, saw diversion terraces, new



Look at the size of the sweetclover grown by Clyde Morrison in his orchards. The clover serves as green cover, can be cut for hay or silage, may be harvested and used as mulch, or may be disked into the ground where it stands.

orchards planted on the contour, sod waterways, alternate sod middles, farmer-built contour furrows in pastures, marl being spread, and peat being scattered for mulch in orchards.

New diversion terraces have been built on the Van Cleve farm, managed by Dave Murray. Sweetclover, bluegrass and rye, early fall seeded, have covered that washy soil. On Murray's own farm he has built diversion terraces, a farm roadway—and has seeded and sodded the roadside ditches to avoid washing.

"Who built the terraces?" I asked Rosencrans.

"The farmers did. They say to us, 'Show us where to put it and we'll build it.' "

Murray's orchards are green with alternate sod middles. His neighbor, Bert Kroupa, has set a new cherry orchard on the contour. Now he is planning two adjoining tracts for contouring. We stopped at the roadside to talk with Oakley Lardie, young fruitman and Tripple-A checker. "Yes, a lot of them are taking to conservation, especially sod waterways and alternate sod middles," he remarked.

Where the farms of Mrs. Nellie L. Bostwick and Francis H. Hughes join up, you can walk entirely across the peninsula from East Bay to West Bay and never be out of orchards protected with alternate sod middles or complete sod mulch.

There are steep slopes on some of those Old Mission sand dunes, as steep as 45 percent. Soil conservationists would rather not see fruit trees planted on them at all. Yet, sometimes the owners feel that they must

(*Continued on p. 79*)

A. Erosion on 3½-percent slope, Houston black clay, typical black clay land of Texas Black Belt; on unprotected field with rows running downhill. Note cotton covered up at foot of slope and enormous amount of soil washed out of fields as result of early summer rains. Near Mesquite, Tex.

B. In contrast to A, there is little erosion here under strip cropping on same kind of land.

Land and People

By H. H. Bennett [1]

THE FIRST big surprise of the trip came at the soil conservation meeting at Red Oak, Iowa. It was one of a number of similar meetings held in Iowa during *Soil Conservation Week*, June 2 to 7, inclusive, proclaimed by Governor Wilson for the State. Here at Red Oak, it was announed that in this region of straight-line plowing *fully half of all this year's corn in this typical Corn Belt County of Montgomery had been planted on the contour*. Four years ago, I was told, not an acre of corn was grown on the contour in that county.

This mass action on the part of farmers of Montgomery County, west-central Iowa, afforded the kind of surprise that makes soil and water conservationists feel good all the way through. It called to my mind what Secretary Henry Wallace said to me one day in 1936 after listening to some of my complaints about the slowness with which Plains' farmers were taking hold of our proved methods for controlling dust storms. He came back in reassuring words to the effect that we needn't be too discouraged about it, because, according to his observation, it often takes farmers around 6 or 7 years to begin to adopt new agricultural practices on a large scale, even after seeing them in effective operation.

Elsewhere in Iowa, I saw occasional fields with corn planted on the contour, and here and there some strip cropping and terracing—not a great deal but enough to show that 7 years of work in Iowa is beginning to get results. I saw some of those things along the same highway I traveled as I crossed the eastern part of the State in 1939, although 2 years ago I did not see a single contoured field or a single field in which any real soil conservation measure was in use.

New light on the value of soil conservation to farmers.—We visited F. E. Confer's farm near Red Oak, where we saw a completed job of *total soil conservation* covering the entire farm, in which some 10 different measures had been applied to meet the needs and the adaptabilities of the various kinds of land on the farm. Afterward someone asked the owner what value he placed on his farm now as compared with the value before treatment.

"Well," Mr. Confer replied, "I am satisfied with the erosion-control work. I have been living here on the farm about 35 years. I hope to continue living here with my son and his children. I think we can and will do just that. We look upon this farm as a place to live and make a living. We are not thinking of selling and haven't a price on the place."

That was a mighty good answer. A good farm, if you keep it good—and you can, with proper conservation practices—is a good place to live. It is a basis for "a way of life." Some people will want more definite information, and here are some figures that may be helpful in getting a slant at the dollar angle:

The Confer farm is a typical Missouri Valley loess farm and, like all other farms on this kind of land, is subject to impoverishing erosion where not adequately protected. It is quite representative of the average of 132 farms recently studied with respect to net income. About half of these had been treated with soil conservation measures in the West Tarkio soil and water conservation demonstration project,[2] established under the Soil Conservation Service program in 1934. Records kept on these farms show that the average net income was $366 and $348 *greater per farm on the conservation-treated farms* than on the same kind of Missouri Valley loess land without conservation practices. Those figures were for 1939 and 1940, respectively.

I saw flood control operating at McGregor.[3]—At Decorah in Winneshiek County, Iowa, we got an eyeful of what unleashed rainfall can do to land and property and people. We were met a few miles outside town by a number of prominent citizens interested in agricultural matters, and were taken immediately on a tour to see how things had stood up under the impact of 7 inches of rain that had fallen in about 2 hours, a week before. The damages in the county were roughly estimated as follows:

1. Cost of taking silt out of the cellars and off the streets of Decorah, including damage to buildings and other property	$200,000
2. Repairs to two railroads, neither of which had operated a train since the flood, and had more than an additional week's work to do before trains could be run	400,000
3. Damage to county highway system—bridges washed out and damaged, roadways damaged	300,000
4. Soil erosion—direct damage to land	500,000
Total (partial)	1,400,000

Gullied and sheet-washed fields, lower slopes covered with debris (rich soil washed from fields upslope), corn covered or washed out, and alluvial lands gouged out, all made up a dismal picture, especially in view of our full understanding of the richness of these northeastern Iowa farm lands.

[1] Chief, Soil Conservation Service, Washington, D. C.

[2] See *Withstanding a Test That Comes Once in a Century.* By R. H. Musser, Soil Conservation, August 1937.

[3] See *Defense—From Ridge to River.* By L. R. Combs. Soil Conservation, May 1941.

But there was some consolation. Our escort took us over to see the Willard Torgrim farm. Here there was little evidence of erosion.

Then they took us to a high point commanding a view over six adjoining farms—all the farms within an entire drainage basin—and again we saw little evidence of erosion or excessive run-off. These seven farms, like the Confer farm near Red Oak in west-central Iowa, had been treated in their entirety with an all-out, completely coordinated type of soil defense. They were part of the some 200 SCS-CCC soil-conserved farms in Winneshiek County—where soil and water were held in the fields and pastures, and where farmers insist they can stay and at least make a living.

At Decorah I had the pleasure of again meeting a gentleman who came into my office in Washington one day in 1935. He was a Member of Congress then. Said his name was Fred Bierman and that he had dropped in to find out what was going on in soil conservation—had no business, just getting acquainted with Government people, programs, and the like.

When he showed up at Decorah, I recalled his asking on this former occasion, nearly 6 years previously, "Were you ever in McGregor, Iowa?" "No," I had replied; "I don't recall having ever heard of the place."

"Well, it's an old place," the Congressman said, without seeming to have heard what I said. "The buildings stand mostly along a single main street, and back of these the ground rises rapidly to farming country several hundred feet above. The site of the town is a narrow valley; a creek flows down the bottom of the valley, through the town and out into the Mississippi River at the end of Main Street. It's a beautiful location—wooded slopes, for the most part, many birds, good farming country back on the uplands. May be some erosion up the hollows that slope down from the highlands to the floor of the main valley.

"McGregor is an old town. Its history is very interesting. It was an important shipping point in the heyday of Mississippi River traffic. Boats still call there occasionally, but the railroad handles most of the traffic nowadays. Many beautiful pearls have been collected in the locality, from fresh-water mussels. I suppose you can still find them.

"Mighty fine people in McGregor—good business folk, conservative, industrious. They love their town. But it has a drawback that doesn't seem to get any better; seems to be getting worse, in fact. Water gathering on the slopes during heavy rains rushes down the draws and converges into the main valley stream. The town has constructed a rock-walled floodway which takes care of the lighter floods. But this overflows during heavy rains and sometimes—rather frequently, in fact—does a lot of damage. Spreads mud all over the streets, fills cellars, runs into the stores on occasions, and I've been told automobiles have actually been washed out into the river. The people are getting discouraged about the situation—the expense of it, the worry and uncertainty. The town seems really to have fallen into the clutches of a grievous flood problem, and judging by the amount of mud that they have to lift out of their cellars and haul off the streets, there may be an erosion problem higher up the drainages that follow down the hollows from above."

Finally the Congressman rose and started toward the door. "I'm not an engineer and I don't know," he remarked with an air of resignation, "but I suppose nothing can be done about the problem."

"What makes you think nothing can be done about it?" was my only reply. But that reply, put in the form of a question, seemingly gave the Congressman some hope. At any rate, he turned back, pulled up a chair, reseated himself and said, "What do you mean? Do you think anything really could be done—anything practicable?"

That was the starting point—the point that eventually led to visits to McGregor by Service engineers, agronomists, and other technicians. A careful survey was made of the entire watershed and cost estimates were computed. Finally, it was decided that something could be done. A plan was perfected. The McGregorans proffered various reasonable contributions. The Soil Conservation Service went in. Three detention reservoirs were constructed on the main "drainages that follow down the hollows from above," as Congressman Bierman put it. Erosion control practices were installed on all cultivated land within the drainage basin. Grazing was restricted or stopped entirely over the steep woodlands. Fires were controlled. The job is completed.

I went to McGregor to see how the setup was working out—just before our visit to Decorah. They had had a 2½-inch rainfall about a week before—a quick heavy rain of the kind which hitherto had sent charging floodwater and mud and muck all over the streets. But this time the floodway down through the town hadn't overflowed or come anywhere near overflowing. I was told by citizens and by flood specialists that this was the third heavy rain since installation of the detention dams and erosion-control

Gullies leading into the valley of the Trinity River. The whole slope stripped of topsoil and severely gullied. East Fork of the Trinity in violent flood, covering cotton, corn, pastures, houses and farm machinery.

work, and that not even a threat of flood conditions had occurred in the town. Everything had worked like a clock, they said. The general consensus of opinion was that the work already had saved the town thousands of dollars. One man estimated that the two 1941 rains, without the protection, would have cost McGregor around $20,000. And the conservation-treated farms along the upper slopes showed great improvement since the time I last saw them. There was no evidence of serious soil washing by recent rains. The wooded slopes were turning beautiful again—clumpy and lush.

A highly successful job in erosion control, flood control, and silt reduction had been accomplished, all at one stroke—through the coordinated use of various measures to meet the needs of the land.

When I met Mr. Bierman in Decorah he expressed himself as greatly pleased over the success of the project.

While at McGregor we went 2 miles up the Mississippi River to Marquette, Iowa, to examine some of the effects of the 5-inch rain and resultant violent flood that struck there in the fall of 1940. Plenty of evidence of the damage remained. The estimated cost to railroad and other properties amounted to more than $50,000. The town of Marquette is situated in the same type of valley as McGregor. The latter received the same amount of rainfall as Marquette, but it didn't cost so much. It did no damage whatever.

The miracle of Coon Valley.—If you had known the rolling lands of southwestern Wisconsin as they were on the occasion of my first visit to the locality in 1927, you would easily understand what is meant by the miracle of Coon Valley.[4]

When the Soil Conservation Service demonstration project was started in the valley in 1934 sheet washing was rampant on most of the sloping lands, and gleaming yellow splotches of poor eroded subsoil were a prominent characteristic of the landscape; the main creeks were all flood streams; wildlife was disappearing; farm incomes were dwindling.

Driving about the valley on Sunday morning in early June this year, the countryside was peaceful, green, and beautiful, and erosion seemed to have been controlled. Most farms had turned to conservation; there was abundant evidence of increasing soil productivity, clearing streams, decreasing floods. More wildlife were in the hills and more fish in the streams.

Since my first visit, a rounded type of agriculture had been implanted upon the slopes of the hills and valleys. Bands of rotation strip crops, ribbons of contoured rows, winding terraces becomingly encircled the figure of Mother Nature, who, on that Sunday morning, was strutting her stuff in the billowing folds of June verdure.

Instead of the yellowing, bedraggled, pockmarked appearance of a country headed for poverty and abandonment, the evidence of which I had seen in 1927, the countryside seemed pulsing with life and vigor and had all the characteristics and fecund beauty of a growing, virile rural community.

I was told that 413 of the 800 farms in the valley had been successfully treated for the ills of the land during the period of the soil conservation demonstration; and that some 30 to 40 additional farmers of the community had adopted the conservation practices of their neigh-

[4] See *Coon Valley—4 Years After.* By R. H. Musser. Soil Conservation, May 1939.

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bors since the close of the demonstration. Also, under the new district set-up about half of the remaining farms were moving rapidly toward the safeguarding of their lands.

People who lived in the valley—farming there—told me of the increased income they derived from their operations as the result of soil and water conservation practices and readjustments in land use. They told me about the increasing wildlife, the better fishing, a better farm outlook, and other improvements on the land and among the people. I saw with my own eyes the darkening color of the soil resulting from increased soil-saving and soil-building crop rotations, used the new way, i. e., crop rotations practiced on the contour plan, rather than by isolated, unrelated fields. I saw the effectiveness of the control practices—the absence of rills and gullies in conservation-treated fields and their abundant presence on untreated land.

And then at a lovely picnic spot in a verdant valley, through which a diminutive stream babbled merrily, I joined with the people of the countryside, talked with them, picnicked with them, even spoke to them—about soil defense and national defense—and learned from them their great pleasure over the miracle of Coon Valley, and their renewed hope and faith in the land they tilled.

It was told not only by Coon Valley people but by others from various parts of Wisconsin that soil conservation had come in the very nick of time to save their farm lands, and their way of life. There were some four thousand of them at the picnic—men, women, and children, come together in celebration of the miracle that had been wrought on the farm lands of Coon Valley. We played baseball, talked, listened to the band, and ate fried chicken.

I took the liberty of mildly chiding the picnickers about their misinterpretation or violation of the ways of nature in undertaking to impose a straight-lined, square agriculture upon a round country. I pointed out that cows, sheep, and goats, when you turn them loose on a hillside, discovered long ago that it was easier to travel on the level than up-and-down hill. Of course, many farmers are still doing a lot of off-contour plowing in Wisconsin, but many others have learned that horses "blow" less when plowing on the level, and that man does not tire so quickly in following them around the slopes. They have also learned that tractors take it easier, use less gas, less oil, and do not wear so much; and that rainfall soaks more freely into the ground, to the benefit of the land.

So, I found that a real beginning has been made in Wisconsin, and down in Iowa—and Illinois too—with contour farming and other soil conservation practices.

An Illinois soil conservation district.—There would have been quite a lengthy stop-over at St. Louis between trains—on my way to take part in another Soil Conservation Week celebrated by proclamation of the Governor, down in Arkansas—there would have been, that is, if one of the boys working across the river in Illinois had not come over to take me for a brief tour of the Shiloh-O'Fallon Soil Conservation District.[5]

Accompanied by the chairman of the district board of supervisors—a farmer—we went over four farms where soil-conservation jobs had been completed. The operators all expressed themselves as pleased with the conservation help given the district by the staff of technicians assigned to assist the farmers. They stressed the effectiveness of terracing, grassed waterways, contouring, pasture improvement, strip cropping, and wildlife work. The district is very active in replenishing wildlife on eroded farms by assisting with posting the land against unauthorized hunting and by encouraging the cooperation of hunters from town—cooperation to the extent of actually doing something to improve conditions for game.

The farmers of the district are hopeful that the conservation work will help to raise the water table of the locality. So many wells have lost capacity and so many springs have dried up that numerous farmers are now hauling water from town to country for their stock. Fifty or more farmers haul water from Belleville and others haul from the Mississippi River, in order to make up the deficiency—caused, the farmers believe, by excessive run-off of rainfall.

Some measure of how farmers like the district plan for handling the erosion and water problem is afforded by the steady increase in the size of the Shiloh-O'Fallon District since its formation in 1938. By petition of outside farmers and a vote requiring a double majority—a majority of all landowners voting and a majority of those approving—the size has been increased by six separate additions to the original area of 17,500 acres, owned by 264 operators, to the present acreage of more than 220,000, owned by 1,878 landlords.

Central Valleys District celebrates.—The Central Valleys Soil Conservation District [6] covers 1,275,000 acres in central Arkansas. The occasion of my visit was the celebration of the establishment of the East Cadron Creek soil-conservation demonstration in 1934 and the subsequent setting up of the Central Valleys District in 1938. Again some four thousand rural

[5] See *To Promote the General Welfare.* By the Directors of the Shiloh-O'Fallon Soil Conservation District. SOIL CONSERVATION, Nov. 1940.

[6] See *New Patterns of Land Use in Two Southern States.* By Wellington Brink. SOIL CONSERVATION, June 1939.

Contour strip cropping; corn, grain, alfalfa, grain, alfalfa. Protected woodlot in background.

people came together to celebrate progress in soil conservation. We talked about control of soil erosion and about national defense and had a wonderful time.

Governor Homer M. Adkins gave an outstanding talk on soil conservation, saying among other things:

"I have watched this soil conservation program and I know what it means to the hill farmers of Arkansas. I am delighted to see so much of this poor, eroded, steep land going back into permanent pastures. There is Arlie Odom, one of my friends here in Van Buren County, who has a 220-acre farm. Arlie, who is a cooperator with this district, has retired 100 acres from cultivation to permanent Bermuda grass pasture. He has kept 75 acres of his best land in cultivation, and he is protecting it from soil erosion with what technicians of the Soil Conservation Service call a complete conservation farming system. He has terraced this land, he has strip crops on it, and he is improving the soil with a good crop rotation.

"Many of you also know Riley F. Trawick in Cleburne County. Riley Trawick, another of the farm cooperators with the Central Valleys District, has sodded about 300 acres of old pasture to Bermuda grass and has established 20 acres of new Bermuda grass from cultivated land. And he's using this pasture to grow good livestock. I believe that Riley now has about 50 high-grade Shorthorn breeding cows. The land he has kept in cultivation is protected by terraces, contour cultivation and strip crops, and Riley Trawick thinks so much of the soil-conservation program that he has helped about 20 of his neighbors to get assistance from the district too."

The Central Valleys Soil Conservation District comprises 1,315,000 acres in the central part of Arkansas. By the end of May 1941, plans had been completed for work on 1,305 farms covering 156,000 acres. The district supervisors, on this date, had received 1,796 applications for plans and work. Conservation surveys had been completed for 671,000 acres, and work was rapidly advancing in may communities. During May, 18 group meetings and 16 educational meetings were held in various parts of the district.

Group planning.—In both Iowa and Arkansas, I found that group planning for soil and water conservation is bringing remarkable results. In the former State the system, as used in districts, deals with small groups of about 6 to 10 or 12 farmers living within small watersheds. In Arkansas small community groups usually constitute the unit for planning. In both instances, certain farmers are taking leadership in getting the movement under way; in some of the Arkansas districts the supervisors are pushing the movement to the extent of designating, more or less unofficially, some of the community leaders as assistant supervisors.

It is being found that this method not only is getting a quicker and better understanding of methods of sound conservation practice and of such fundamentals as land-use capabilities, but farmers are showing a decided improvement toward getting actively into the program.

In the Pleasant Valley community of the Central Valleys District, 33 farmers, after meeting together with a few technicians several times, and after doing

STATE OF ARKANSAS
Executive Department

PROCLAMATION

To All to Whom These Presents Shall Come—Greetings!

WHEREAS, Arkansas has been wonderfully blessed with natural resources which include a great variety of bountiful soils;

WHEREAS, the soil, which provides our food, clothing, and most of our shelter, is our most important natural resource;

WHEREAS, soil erosion, which saps the vitality of our soil and thereby threatens the very foundation of our State and our Nation, is attacking more than 16,000,000 Arkansas acres and has ruined for further immediate productive use more than 1,000,000 acres;

WHEREAS, the people of Arkansas have been quick to recognize the grave problem of soil erosion, and the State of Arkansas became the first State in the Nation to enact a soil conservation districts law enabling landowners to organize soil conservation districts for a cooperative attack on soil erosion and related land-use problems;

WHEREAS, the soil conservation district movement provides for the operation of the democratic process in agriculture, permitting our people to solve their problems with the petition and the ballot;

WHEREAS, the landowners of Arkansas have organized 30 soil conservation districts and have in process of organization 8 other soil conservation districts, all covering more than 18,650,000 acres;

WHEREAS, more than 11,000 landowners of Arkansas have entered into cooperative agreements with the supervisors of their soil conservation districts for the establishment of complete and coordinated soil conservation farming systems on approximately 1,360,000 acres;

WHEREAS, each month more than 500 farmers, owning and operating approximately 60,000 acres, are entering into cooperative agreements with the supervisors of soil conservation districts;

WHEREAS, soil defense is an integral part of national defense, and the soil conservation efforts of our people are making America more than ever worth defending;

WHEREAS, this is the seventh anniversary of the establishment of the East Cadron Creek Watershed in Faulkner, White, and Cleburne Counties as the first demonstration project of the Department of Agriculture Soil Conservation Service in Arkansas, the sixth anniversary of the establishment of CCC camps in Arkansas to assist farmers in controlling soil erosion, and the third anniversary of the beginning of operations in Arkansas soil conservation districts, which placed the conservation program directly in the hands of landowners;

WHEREAS, the State of Arkansas will be honored by a visit from Dr. H. H. Bennett, Chief of the Soil Conservation Service, of Washington, D. C., who will speak at a State-wide soil conservation rally at Damascus, Tuesday, June 10;

NOW, THEREFORE, I, HOMER M. ADKINS, Governor of the State of Arkansas, do hereby proclaim the week of June 9–14 ARKANSAS SOIL CONSERVATION WEEK and respectfully urge that the citizens of the State of Arkansas observe this week fittingly by renewing our resolution to conserve, improve, and develop our great soil resources not only for our own benefit but also for the benefit of the generations to follow us.

IN TESTIMONY WHEREOF, I have hereunto set my hand and caused to be affixed the Great Seal of State in the Governor's office this 29th day of May, 1941.

[SEAL] (Signed) HOMER M. ADKINS,
Governor.

(Signed) C. G. HALL,
Secretary of State.

considerable planning on their own account on their own farms, joined in and worked on each other's farms until such heavy work as terracing and preparing water channels was completed or carried as far as immediate needs called for. As rapidly as the farms were planned, neighbors in the Pleasant Valley community pooled their teams and equipment and helped, farm by farm, to install various items called for in the plan.

At Damascus, I met Thad Harper, a 73-year-old farmer who, with his 23-year-old mule, had helped with terracing and other work on 31 of the 33 farms in the Pleasant Valley community. I was told that during the course of the group discussions and the self-help planning of farms in this community, Mr. Harper made the first public talk of his life—on the subject of soil conservation.

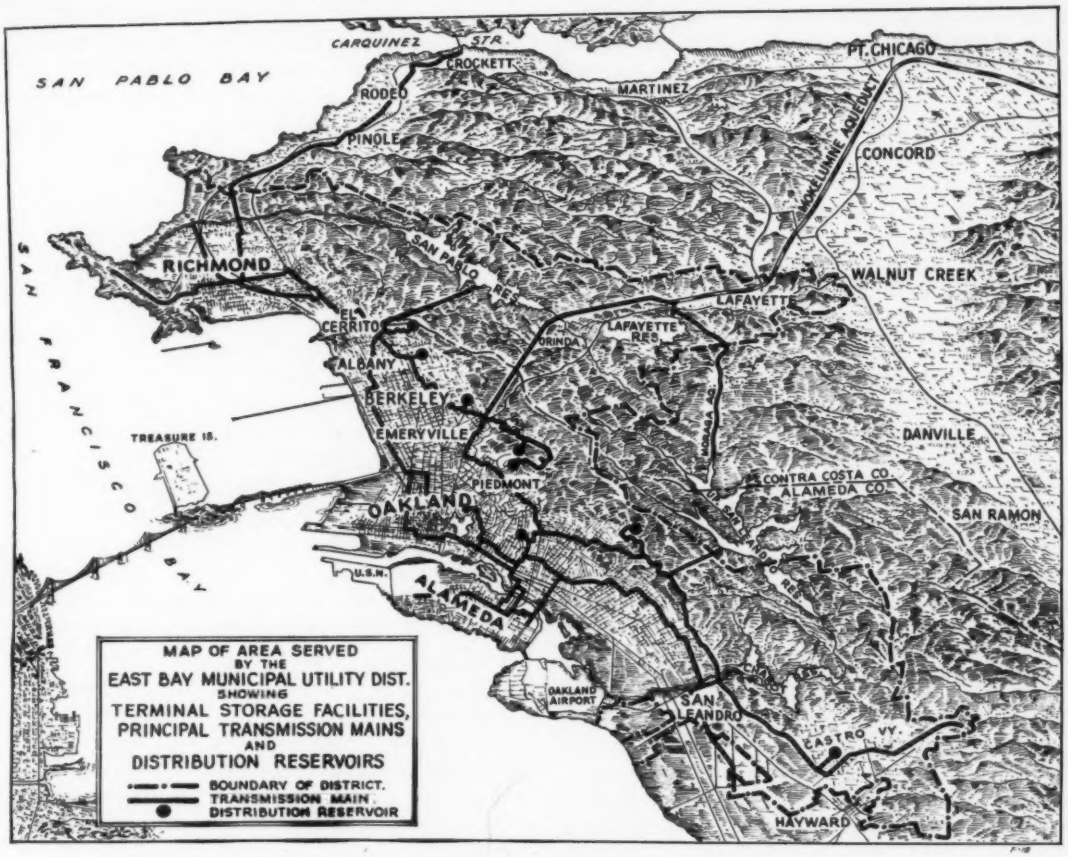
Floods on the Trinity.—From Arkansas I went to the Texas "Black Belt," along the Trinity River, arriving in time to see some of the flood damage resulting from permitting too much of the recent rains to run off the land and pile up in the Trinity and its affluents.

On June 12, we found that every unprotected cultivated field from Fort Worth to Rockwall County had lost much soil by sheet washing and gullying. Some fields had lost in the neighborhood of 25 tons an acre as the result of the June rains this year. Cotton and corn were buried at the foot of slopes, and the Trinity was over its banks in great stretches of muddy flood water, inundating thousands of acres of cotton, corn, pasture, and small grains.

At one place in eastern Dallas County, I walked across a long slope extending from a highway down to the edge of a broad overflow of the East Fork of the Trinity, caused by a break in the levee. Here gullies opened up years before by erosion that easily could have been prevented, had been speeding water into the Trinity. For approximately half a mile every vestige of topsoil had been washed from a former field of rich Black Belt clay, down to an impervious subsoil as favorable for shedding rainfall as a metal roof. This break in the levee of the East Fork was in the locality of Mesquite, where an SCS–CCC camp has treated 43,000 acres for soil conservation.

The conservation work that had been done in the Black Belt generally had held erosion to a relatively low degree throughout the rainy season in the areas treated, especially where strip cropping, terracing,

(*Continued on p. 81*)



EROSION CONTROL FOR RESERVOIR PROTECTION

BY HARRY E. REDDICK [1]

THE East Bay Municipal Utility District is usually referred to by those living on the east side of San Francisco Bay as "the District." Water supplies for domestic and industrial purposes are supplied by the district to a population of more than 500,000 people living in towns, villages, and communities scattered along the eastern side of the bay, or in close proximity to it, from Hayward on the south to Crockett on the north where the bridge spans Carquinez Straits. The cities, towns, and villages served include Oakland, Alameda, Berkeley, Richmond, Piedmont, El Cerrito, Albany, Emeryville, and San Leandro. In addition these rural districts are served: Castro Valley, Lafayette, Kensington, San Pablo, Fairview, Saranap, Chabot, Colonial Acres, Orinda, Ashland, Mulford Gardens, Rodeo, and Pleasant Hill.

The Soil Conservation Service has been actively concerned with this municipal utility organization since January of 1940 when Chief Bennett signed an agreement with the East Bay Municipal Utility District agreeing that Service technicians in the region would develop an erosion-control program to be used on watersheds surrounding local reservoirs of this nonprofit publicly owned corporation for the purpose of reducing the rate of sedimentation in their storage basins.

Seventy-five percent of the water used by the more than half a million people in the district comes from the Mokelumne River that drains a watershed of 575 square miles in the Sierra Nevada Mountains in Al-

[1] Regional conservator, Pacific Southwest Region, Soil Conservation Service, Berkeley, Calif.

pine, Amador, and Calaveras Counties, a hundred miles or more from the areas where it is used. The water is taken from the Mokelumne River into the Pardee Reservoir near Valley Springs, Calif., for storage. This reservoir, with a capacity of over 210,000 acre feet could, if filled, supply the present needs of the district for more than 4 years.

The water from the Pardee Reservoir is distributed to the district through 93 miles of aqueduct with a gravity-flow capacity of 40 million gallons a day which can be increased to 70 million gallons by the use of pumps located near the boundaries of the district at Walnut Creek.

Storage at the western end of the Mokelumne Aqueduct is provided by local terminal reservoirs having a combined capacity of 101,550 acre feet. The run-off from the drainage areas tributary to these reservoirs is impounded, and it provides the balance of the draft for the district not diverted directly from the Mokelumne River. A large excess storage is provided in the local reservoirs to furnish a continuous water supply in the event of a break in the main aqueduct leading from Mokelumne River. A severe break, such as might occur during an earthquake, could put the aduequct out of use for a period of 6 months, during which time the increased draft on these reservoirs would exhaust the local storage. Thus, the terminal reservoirs form an important link in the distribution system.

The watersheds surrounding the local reservoirs of the East Bay Municipal Utility District are contiguous to each other. Together they comprise a strip of rolling, hilly-to-mountainous land, with detached valleys along minor stream bottoms, approximately 18 miles long and 5 miles wide, lying in Alameda and Contra Costa Counties. Elevations vary between 240 feet to 2,000 feet above sea level. The precipitation, 60 percent of which occurs in the 3 winter months and 89 percent from November to April 1, ranges from 22 to 30 inches per year. Approximately 500 families live within this area, mostly professional or businessmen who commute between their homes and the Bay area.

The watersheds vary in size as follows: Lake Chabot, 11.75 square miles; Upper San Leandro, 30.30 square miles; Lafayette, 1.34 square miles; San Pablo, 32.15 square miles; Pinole, 10.50 square miles. They have a total area of 86.04 square miles. The district-owned portions of these watersheds are as follows: Lafayette, 100 percent; Chabot Watershed, 92 percent; Upper San Leandro, 45 percent; San Pablo, 56 percent; Pinole, 24 percent.

Grazing has been the primary agricultural enterprise since the time of the early Spanish land grants. Greater amounts of grain and hay were grown in the early days than at present, although within the last 30 years but few changes have occurred in either the types of crops or in the area under cultivation. Grain, tomatoes, pears, and alfalfa are grown to some extent, mostly on private land. Approved rotations have been adopted on all of the 270 acres of district-owned land under cultivation on which agreements have been signed.

Four reservoirs are now in operation and another (Pinole) is proposed. San Pablo has a capacity of 43,149 acre feet; San Leandro, 41,398; Chabot, 12,553; Lafayette, 4,450 acre feet.

The slopes of the ground surface draining into the main streams are relatively steep and range in grade from 10 to 40 percent and even higher. Sheet erosion is not severe over most of the areas, but large quantities of sediment are carried into the reservoir each year from numerous actively eroding gullies and drainage channels.

The watersheds of the district contain some small areas of cultivated lands located principally in the small valleys and along the stream channels. The hilly portions are utilized mainly as grassland for grazing or are wooded or covered with brush.

The district has by no means been unaware of the sedimentation that is affecting their reservoirs. For the past several years of their own initiative they have carried on studies and done some work in controlling the problem.

L. Standish Hall, hydraulic engineer of the district, has estimated that it costs approximately $55 per acre foot to provide the storage they now have, and it seems probable that this figure will increase, should additional storage be needed in the future, as a result of advance in land values as subdividers open new areas along the valley floors. Because of the costs and for other reasons, a survey was made to determine just how fast the reservoirs of the district were filling with sediment. The survey in 1939 of the San Pablo Reservoir, a storage basin designed to hold 43,149 acre feet of water, revealed that 2.63 percent of the total capacity of the reservoir had been destroyed by deposited sediment since its establishment 21 years before.

Although the rates of sedimentation are moderate in the district's reservoirs, the amount of erosion per acre of watershed is exceptionally high. Observations show that the sources of sediment are, (1) natural watercourses, (2) accelerated or man-made gullies, (3) private agricultural lands, and (4) landslides and slips.

The movement of the sediment is caused by, first, increased run-off resulting from construction of roads, buildings, etc., and improper land use and cultural practices; second, the seasonal distribution of rainfall; and, third, the character of soil and topography.

The program worked out jointly by Service technicians under Area Conservationist Gosline and Mr. Hall for the district is designed to reduce gradients and minimize abrasive action in streams by means of check dams, and to reduce erosion on the watersheds by means of planting. In more detail it includes the following specific practices:

1. Erosion-control structures in natural waterways, accelerated gullies, and roads.
2. Plantings:
   (*a*) To stabilize gullies.
   (*b*) For protection of streambanks.
   (*c*) To stabilize road banks.
   (*d*) For stabilization of watersheds by forest plantings.
3. Proper land uses.
4. Protection of wildlife.

"If we can reduce the silting by one-half, the program will be worth while," Mr. Hall commented regarding the program.

Some of the private owners of land in the watersheds already have started erosion-control work on their own initiative. Since the law governing the district prohibits their spending money on privately owned land, and since their purchase of such land at "city lot" prices is impractical, the control of erosion on the privately owned areas will have to be the result of voluntary action or of some form of agreement with the Soil Conservation Service or another agency.

While the proposed boundaries of the contemplated soil conservation district in Contra Costa County do not include the privately owned lands of the East Bay Municipal Utility District watersheds, it is hoped that these areas may be added at some future time. The Soil Conservation Service is well equipped to provide farm plans for such areas, should they be included in a district. A progressive physical survey of the watersheds has been completed, and land-use capability maps have been prepared. The agreement signed by Chief Bennett on January 22, 1940, applied only to the watersheds owned by the district in Alameda and Contra Costa Counties; it included watersheds of San Pablo, Lafayette, Pinole, and San Leandro Creeks. However, the agreement does recognize the necessity for erosion control on the interspersed privately owned lands.

The district agreed to furnish technical data, now available, that will be of assistance, and to continue observations relative to run-off and sedimentation. They also agreed to carry out plans prepared by the Service technicians and to perform such operations as were included in the agreement.

Separate agreements are drawn up for areas of 40 to 1,000 acres, depending on the size of particular watershed segments. After the conservation plans for all units are developed by the division of farm management of the Service, they are reviewed and approved by technicians of both agencies. The work is to be done with WPA labor in accordance with Soil Conservation Service recommendations.

The program calls for the planting of trees. To date 57,000 trees have been set out, in addition to 200,000 cuttings. The trees and cuttings include conifers, broadleaf evergreens, and deciduous species. The trees for the planting program will be supplied by the regional nurseries of the Soil Conservation Service at Pleasanton. It is estimated that more than 200,000 will be used during the winter of 1941 and 1942.

Both reservoirs (Missouri type) and check dams will be used on small tributaries to the main streams. On San Pablo Creek one large concrete dam designed to discharge flood flows up to 9,000 second-feet of water, has been recently completed.

The completed structures have just passed through a season of local precipitation averaging about 50 percent above normal. All the structures functioned satisfactorily during the heavy run-off resulting from this wet winter, thus demonstrating their effectiveness in controlling erosion from the watershed.

WANTED: TECHNICAL ASSISTANCE ONLY

(*Continued from p. 69*)

use the slopes because of their high investment in the land. On such slopes, they use bench terraces—a sort of stairstep arrangement on roadways around the hill. This allows for pulling spray rigs and other equipment along the graded terraces, with the trees planted between, where the original slope is undisturbed. Typical examples can be seen on the farms of Dr. Gale Gleason, Leslie Jameson, and Merton A. Gilmore.

Roy Hooper was picking crab apples. He showed us the marl he had spread, the peat mulch under his cherries, his contour orchard set in the spring of 1940, and his newly constructed bench terraces.

Harold Jameson wanted some contour lines run in connection with reseeding a pasture. The soil conservationists were too busy to help him. "Then lend me your levels and I'll run them myself," Jameson

(*Continued on p. 86*)

FOOTPRINTS IN HIS FIELDS

BY WILLIAM C. PRYOR [1]

Sighting contours.

THE name on the mailbox in front of his Iowa farm is S. F. Emerson, but everybody calls him "Rook". He believed in farm conservation when a lot of his neighbors were still dubious about it.

Even his father-in-law, William Reiger, was doubtful, and insisted to the last on having his fields neat and square and the rows straight and orderly no matter how the land lay. That is the way it was until one day William Reiger's time came, and there was the farm left to his two daughters, and Rook with the job of running it. You might think it was not a very attractive proposition for a man to rent a place from his wife and sister-in-law, but for Rook it was all right, because his wife is in sympathy with his views on conservation farming, and his sister-in-law had no objections.

He went ahead, slowly at first, with his plans. The farm was near but not in the area of the Indian Creek demonstration project, and there was no soil conservation district, districts being new in Iowa. But Rook Emerson was determined to farm the place along conservation lines; he visited the project, read conservation, attended conservation meetings whenever he had a chance. He found that reading, looking, and listening did not lay out contours and build terraces, however, and then it was that he decided on direct action.

His method of attacking the problem was a little unusual. He saw an opportunity not only to improve the farm he was operating but to advance the whole idea of conservation farming in an area where some people were inclined to think it was just "something the boys in Washington had thought up."

He went to the instructor of the vocational agriculture class at the high school at Lisbon, Iowa, and offered his farm to the class as a laboratory for trying out conservation practices. This was "right up the alley" of the "voc-ag boys"—they accepted with enthusiasm. Emerson entered into a 5-year agreement with the class, just as though it were a demonstration project or a district.

The class held five meetings which were given over entirely to discussing the Emerson farm and its conversion to conservation farming. Harold Nilsson, SCS conservationist at the area office in Marion, attended the meetings and cooperated with the instructor in directing study by the class of the farm and its problems. They studied conservation-survey symbols, contour mapping, variations in soil types, types of erosion, crop rotations and supplementary practices, and other fundamentals. Emerson himself attended one of the early meetings to explain the crop and livestock plan then being followed on the farm and to tell them what he would like to do in the future. He had tried one cornfield on the contour in 1940, with good results, so that he had a rather clear idea of what he wanted.

With the fundamentals taken care of, the boys set to work preparing the farm plan. They studied the soil, balanced the rotations, set up a new pasture plan, and prepared a limestone chart providing for liming specified acreages of pasture and crop land each year. The finished plan included maps showing the results of the soil survey, the proposed land uses, and the limestone requirements.

Rook attended the fifth meeting of the class and after going over the plan with them accepted it. Then the boys started field work. Having no funds for surveying equipment, they utilized a small farm level and an ordinary carpenter's level for which they built, in the school workshop, such adjuncts as would make them adequate for the job.

Then with their instructor, Severin Sorenson, and Nilsson advising them, they went to the farm and laid out the contours. Afterward they plowed the boundary furrows to indicate the contours. When Emerson began spring plowing this year, he plowed on the contour instead of up and down. He is pleased with the results—pleased, in fact, with the results thus far from every phase of the farm plan.

The boys' plan provided the following: Liming 6 months prior to the seeding of legumes, according to the liming chart; inoculation of legume seed; seeding of waterways to a mixture of red clover, alsike and

[1] Division of information, Soil Conservation Service, Washington, D. C.

timothy; and *no burning* of cornstalks or other crop residues or fence rows, although such burning still is a popular practice with many midwestern farmers.

The rotations set up run from 3-year rotations of corn, oats-clover-timothy, and clover-timothy, to 6-year rotations of corn, corn, oats-alfalfa, and 3 years of alfalfa on certain fields after the prescribed liming schedule has been carried out. Limestone requirements vary from 1 to 3 tons an acre, and according to plan about 19 acres will be limed each year during the life of the 5-year agreement.

Under the plan drawn up by the boys, Emerson will find at the end of the 5-year period that his corn acreage is about the same, except for annual fluctuations due to the rotations; his oats acreage will be increased slightly; his clover-timothy acreage will be cut from a little more than 30 acres to about 18 acres; and 19 acres of alfalfa will be grown where none grows today.

The land devoted to permanent pasture has been reduced from about 62.5 acres to 51.9 acres, but because of greater hay production Emerson can increase his dairy herd and, of course, his income from that source. The plan for the pasture area provides for liming, disking, application of superphosphate, and reseeding with a mixture of sweetclover, red clover, alsike, timothy, and oats.

The results? After all, the plan was not put into effect until this year, but Rook says that results already are apparent, and he expects to make a better corn crop this year than he ever did when he planted his corn in straight up-and-down-hill rows. I myself saw some visible results the day I visited his place with Nilsson and Walter John of the Milwaukee office. The night before it had rained—a "gully washer" if I ever drove through one—and Rook proudly showed us his strip-cropped sloping fields—there had been hardly any soil washing. On the neighboring hillside fields of another farm, where the rows ran straight, some of the corn had been almost washed out.

Every time there is a big rain, Rook finds footprints of visitors in and around his protected fields. The folks around have been a little doubtful, but just the same they are checking on the results. Rook told us that often farmers drive along the road and when they think he is not about they stop and study the fields, then drive away quickly if they see him coming.

"I don't know why they don't come right up to the house and talk to me," he said. "I'd be glad to show them all around and talk about it. I'm glad to talk conservation whenever I get a chance. It's great stuff."

It looks as though Rook Emerson's idea of letting schoolboys experiment with his farm is paying out as he expected it would. The farm is being improved—there is no doubt about that—and the neighbors are getting the idea—no doubt about that, either. Look at those footprints in the fields, and men looking over the fences. Nor are the high-school boys at all backward in spreading the good word around.

As to the real "pay-off," it came when one of Rook's neighbors called Severin Sorenson and asked if the vocational agriculture class would stake a contour line for him to follow in planting corn. Rook is a little amused at this, but he doesn't laugh. It is no more than he had expected. He doesn't mind being a pioneer. He knew what he wanted, and he got it. Now he hopes that all his neighbors will do likewise—get conservation established on their farms. As he remarked, "It is too important to be kept as a secret or to restrict to one farm."

Constructing boundary furrows.

LAND AND PEOPLE

(Continued from p. 76)

and contouring had been employed so that one measure supported another. Some washing had resulted along the lower part of long slopes where strip cropping with oats had been the only measure employed. The oats were of very poor quality—about one-fifth of a crop—and had failed in a number of places to provide normal obstruction to the flow of water—and to erosion of the wet soil.

Glimpses at conditions in these and other States where heavy June rains have followed a long, dry spring, invariably revealed the effects of severe erosion, flooding, and silting damage in all unprotected fields with contrasting conditions of little or no damage in the vast majority of conservation-treated fields.

Obviously, it pays to control erosion, and now that it has been shown throughout the nation that it can be controlled or greatly reduced with practical measures, people are coming to the defense of the land as an inseparable part of good business and national defense.

CCC enrollees from the Mocksville camp handle drag pans pulled by neighbors' teams, demonstrating an economical way of building terraces.

TERRACES AND NEIGHBORLINESS—ALL WITHIN A DAY

By ARTHUR W. SUSOTT [1]

Six students at North Carolina State College of Agriculture and Engineering got first-hand experience in terrace building during the demonstration on the Beck sisters' farm. Two of them are here seen plowing up the terrace site while others study the work.

ALBERT YARBROUGH, farmer living near Churchland in Davidson County, N. C., is an early riser at all times, but on April 22 he was out and on his way, shortly after 2 a. m., to the neighboring farm of George F. Smith. With Smith he then drove on to Salisbury, 12 miles away, where they stopped at a packing plant and loaded 140 pounds of fresh barbecue pork into their car. By 4 a. m. they were back in the Churchland community, this time on the farm of Miss Alice and Miss Cynthia Beck.

[1] Chief, regional division of information, Southeastern Region, Soil Conservation Service, Spartanburg, S. C.

Soon a large bed of glowing wood embers was sending up piercing heat waves from a barbecue pit that had been dug the night before not far from the Beck home. A few minutes later the tantalizing aroma of meat slowly roasting over an open fire spread through the air.

By 8 o'clock the narrow lane to the Beck home was crowded with cars. Neighboring farmers and their families were arriving to take part in a community terracing demonstration, especially planned to help the Beck sisters start a soil conservation program on their 50-acre farm. The two elderly women had not found it easy to run their farm since their four brothers left the home place to begin farming for themselves. In recent years they had rented most of the cropland, and the planting of corn and cotton year after year had begun to injure the land. It had become badly eroded and good yields were difficult to maintain.

During March the Beck sisters entered into an agreement with the Middle Yadkin Soil Conservation District to carry out a complete conservation program on their farm in Davidson County. This county along with four others—Cabarrus, Rowan, Davie, and Iradell—form the district, covering 1,468,160 acres.

The average farmer can establish the practices recommended in a district conservation farm plan without a great deal of difficulty, but the Beck sisters no longer had men folks on the farm, nor could they afford to hire help. On this day, neighbors were coming to help. They were going to terrace 10 acres of land, most of which was to be put into cultivated crops under a new plan of soil conservation. With

terraces, strip cropping, improved rotations, and other soil-saving measures a good portion of their farm could be used safely for cultivated crops.

By 8 o'clock, shouts directed at teams of mules and horses pulling plows and drag pans, and the steady, loud exhaust of tractors, were echoing across the farm. Albert Yarbrough, John Long, Lloyd Davis, and Jesse Beck, a brother of the Beck sisters, brought teams for pulling plows, drag pans, and V-drags, while Hugh Davis and Ellis Snider furnished tractors and other heavier terracing equipment. The Middle Yadkin Soil Conservation District provided a tractor, a No. 1 grader, a No. 2 grader, and 4 drag pans.

Throughout the day the terracing equipment was kept busy. Farmers who had come to observe the use of different kinds of equipment moved about freely. This was one of the first demonstrations in the State to use at least six different kinds of equipment in building terraces. Most farmers appeared particularly interested in the drag-pan or slip-scrape method, which has become popular in the Southeast. All that is needed for this method, after the terrace site has been staked out and plowed, is a team of mules or horses, one man to drive the team, and another man to handle the drag pan. Some farmers use only one mule and handle both the mule and drag pan.

Teams not hitched to drag pans during the demonstration were pulling home-made and factory-built V-drags. The tractors pulled the heavier terracing equipment, No. 1 and No. 2 graders, and a two-bottom disk plow.

Promptly at noon, Albert Yarbrough's voice boomed, "Come and get it!" Teams were unhitched, tractor motors shut off, and lines of hungry men began forming near long tables laden with pans of barbecued meat, salads, cooked and fresh vegetables, pies, cakes, and other food. More than 150 persons were served—many of them a good second helping. The expense of buying the barbecue meat to feed the large crowd was defrayed by contributions from those attending and a sizable check from the Davidson County Farmers Mutual Exchange.

Following the luncheon was a rest period, with short talks by County Agent P. M. Hendricks, O. F. McCrary, district agent of the North Carolina Extension Service, H. E. Newland, work unit technician of the Soil Conservation Service, and others. Also, during the noon hour the farmers studied a large chart placed under a cedar tree; the chart showed new land-use plans as developed for farms in the district.

"We have built terraces before," said County Agent Hendricks, "but today we know how to build them

D. G. Wilson, Linwood, N. C., supervisor of the Middle Yadkin soil conservation district, discusses with Cynthia and Alice Beck the good times farm folk used to have at community events. They agree that terracing bees are the sort of thing needed to preserve the wholesome flavor of rural life.

better. I'm sure the methods we are demonstrating today will help you build good terraces inexpensively and with equipment you have on your farm. As you have already noticed this morning, you do not have to have a big tractor and heavy terracing equipment—you can do a fine job with a team of mules, a plow, and a drag pan."

Mr. McCrary asserted that one of the surest marks of good citizens is rural land well protected against erosion. "Too much land," he deplored, "has been farmed without proper regard for its protection against erosion."

Mr. Newland, who helped the Beck sisters in developing a district conservation plan for their farm, explained the need for employing a variety of conservation measures on the farm to ensure maximum protection against erosion. He told of the district set-up and the opportunity it affords for community action in better land use and soil conservation.

By five in the evening the terracing had been completed—5,500 feet on 10 acres. On the north side the newly built terraces connected with those already built on the neighboring farm of Elmer F. Yarbrough, a son of Albert Yarbrough. In a natural draw in the Yarbrough field is a well-established meadow strip that will catch the terrace water from both the Yarbrough field and the north side of the Beck field. Terrace water on the part of the Beck field that slopes away from the Yarbrough farm will empty into a woods and other safe water-disposal areas.

"Elmer is glad to see those terraces hook up with his," said Mr. Yarbrough, "as too much soil was washing down from the Beck field on to his land."

The Beck sisters were most grateful to their neighbors for the terracing work done on their farm and to those who had helped arrange the demonstration

and barbecue. "I don't know how to thank you," said Miss Alice. "This has been a wonderful day for Cynthia and me. It reminds us of the gatherings we farm folks used to have years ago, and it may be that this kind of thing will help bring them back again." The members of the barbecue committee—Albert Yarbrough, George F. Smith, and S. A. Allred, vocational agriculture teacher in the Churchland community—were also pleased, especially with the weather, as heavy rains had forced postponement of the demonstration on two previous occasions. But on this day the weather was perfect, the sky cloudless and the sun warm.

District Supervisor Wilson was enthusiastic about the possibilities of terracing demonstrations and other district-sponsored activities for preserving the wholesome flavor of country life. "Our rural churches and schools have played an important role in our rural civilization, but many of these have disappeared," he remarked. "We must find new ways of preserving a close and intimate relationship among rural people. We cannot let that disappear."

With the terracing completed, the next step on the Beck farm is to establish the other conservation practices. This is not as hopeless as it might seem, in view of the fact that the two women are not in a position to hire help. Jesse Beck is of the opinion that he and his brothers, all living in Davidson County, can spend sufficient time on their sisters' farm to see that other conservation measures are put on the land and maintained.

"After we married and left the home, it seems the place just went down," Jesse said. "Our sisters couldn't do the work, and there was nothing to do but rent the land. The renters put the land in corn and cotton year after year—and you can see what happened. I'm not blaming them because it was the natural thing to do. I believe, however, that with the terracing, and by working in better crop rotations, strip cropping, and more lespedeza, we can stop the land from washing and make it produce better crops. Some of it will have to be rented out, but if the neighbors who are here today rent it, I'm sure it will get good care. My brothers and I will pay more attention to the farm than we have in recent years."

Jesse and his brothers are deeply attached to the home place. They tell with pride the story of a stagecoach route, operated between Salisbury and Winston-Salem during colonial times, that crossed the Beck farm. During the terracing demonstration Jesse pointed out the place where the stage road had been and the site of an inn. All that is left of the latter is a basement hole overgrown with forest growth. George Washington and other leading early Americans were guests at the inn, Jesse said. Five miles southwest of the Beck farm is a cave that Daniel Boone used. A community park has been built near the cave.

The Beck sisters' farm is the nineteenth in the Potts Creek watershed for which a complete conservation plan has been developed. The 19 farms cover 1,020 of the 1,500 acres in the watershed. It is hoped that the remaining 6 farms soon will be under conservation farming so that the entire area may be protected against erosion. Potts Creek flows into the Yadkin river.

The conservation plan for the 50-acre Beck farm calls for 2 acres of cotton each year, to be grown in a 2-year rotation with annual lespedeza between permanent strips of *Lespedeza sericea*, and 6½ acres of small grain followed by annual lespedeza in a 2-year rotation on the balance of the cropland. Each year all of the cropland except the 2 acres in cotton will be in either small grain with annual lespedeza or in annual lespedeza that has reseeded itself.

In developing the conservation plan it was found necessary, because of the relatively small size of the farm, to increase the cropland from 10 to 17 acres by utilizing 7 acres of idle land. Formerly, 5 acres had been put into corn almost every year, but under the new plan no corn will be grown. Small grain will take the place of corn, as it provides good winter cover for the land and fits into the new crop rotation. The cotton acreage is the same as before.

One acre of *Lespedeza sericea* will be established as a border along the woodland to prevent the encroachment of forest growth into open fields and to provide food and cover for wildlife. About half of the farm is in woodland, and 9 acres of it has been used as woods pasture. These 9 acres will be protected against grazing to encourage the growth of good timber, and 3 acres of badly eroded land will be planted to pine seedlings. The home site and garden occupy 2 acres of the farm.

Late in the afternoon of this day, as the farmers and their families began to leave, Alice and Cynthia Beck stood on their front porch looking toward the gently winding terraces their neighbors had built for them—all within a day. Their faith in neighborliness and in the home place had been happily renewed.

SOON TO APPEAR

Watch for Ed Ogg—he's on his way from a relief job to farm independence. Inspiring to everyone is the story of this man who is "conserving" his way to farm prosperity.

RAINS ON THE PLAINS

By L. L. HARROLD [1]

JUNE 1941 brought copious rains to the semiarid region of the Central Great Plains. Except for the erosion in cultivated fields, the moisture was beneficial—to the extent, in fact, that the luxuriant growth of vegetation surpasses that of many years. Early travelers in this area must have seen the countryside in a somewhat similar condition. At any rate, their glowing accounts attracted many farmers to reap abundant harvest of the land in the abnormal wet years. How well these agriculturists learned that the wet years were the "unusual" is a matter of history; and they learned too that their land-use program must be planned around a supply of moisture considerably less than the unusual.

The Republican River and many of its large and small tributaries flooded because of the June rains of this year, with considerable damage to bridges, highways, and fertile flood plains along the major streams. Yes, and considerable damage to farm land in the headwaters of the basin. In the straight lister rows running up-and-down hill, many miles of 3-inch-high corn were completely washed out along with tons of rich soil.

The preliminary results on the Central Great Plains experimental watershed show that of the 6 to 7 inches of rain which fell in 8 days from June 2 to 9, about 2 to 3 inches fell in a day and a half, with a maximum 10-minute intensity of 5 inches per hour. The watersheds with corn in up-and-down hill straight lister rows lost much corn and soil, and 2.5 inches of run-off for the entire storm. Over half of the heavy rain ran off. Even some of the lister rows of corn that were on the contour were overtopped and broke; but the total loss of corn and soil and run-off was considerably less than that for the straight rows. From the contoured cornfield, 1.6 inches of run-off was measured for the entire storm, and 1 inch for the heavy period.

The wheat, oats, and the strip-cropped watersheds produced less run-off than the cornland during all parts of the storm. For the entire storm the contoured wheatland shed 0.6 inch of run-off, while wheat in straight rows shed 1.4 inches. Oats on the contour shed 1 inch of run-off and straight rows 1.5 inches. The pasture watershed produced about 1 inch of run-off, the meadowland 0.2 inch, and the contour-furrowed pasture only a trace of run-off for the entire storm.

From the standpoint of moisture conservation, a major agricultural problem in this region, it appears that contour cultivation is the most effective practice. Eight-tenths of an inch more water was lost from all cropland in straight rows than from all the cropland on the contour. This amount of moisture—the difference between that retained on contoured land and that retained on land cultivated in straight rows—is of great importance as it may later mean the difference between a good crop and none at all.

From the standpoint of flood control the differences in run-off from land under various crops and types of cultivation, as mentioned above, are significant in that they may be effective in taking the top off a flood peak. However, other conditions may show other results, as the data presented above are for one storm only, and one condition of land and cover, and as such they represent but one point on a curve.

[1] Hydraulic engineer, hydrologic division, Soil Conservation Service, Washington, D. C. This article is based on field observations by the author and on data submitted by John A. Allis, project supervisor, hydrologic division, Central Great Plains Experimental Watershed, Hastings, Nebr.

WHAT DO THE ASSESSORS SAY?

Farmers of the Montesano-Elma-Oakville Soil Conservation District in Grays Harbor County, Wash., received an authentic tip at the county assessor's office as to what erosion has been costing them.

The assessor's records showed that from 1912 to 1940, streambank erosion, caused by fast-flowing rivers draining watersheds with a large amount of cut-over timberland, had eaten away 38.9 acres of rich bottomland on two farms alone along the Wynooche River. The cutting was so severe that it was necessary to remap these and other farms several times in that period in order to maintain a fair assessment base.

To the county, this meant a cut in assessment valuation of $2,939, and $81.40 less tax return every year than would have come into the county exchequer had this erosion been headed off a few years ago. In addition, it spelled unestimated loss in land value and annual crop production for the J. H. Beardslee and Michael Gleason estates just northwest of Montesano.

A survey by County Agent Arthur Kulin, shows that in Grays Harbor County alone, 242 acres of the best bottomland farms tumbled into the streams during the 1934–35 winter and spring rises. Hundreds of farms on the Coast are similarly damaged each year.

LEGUMES FOR DEFENSE

FARMERS in the Holmes County and Montgomery County Soil Conservation Districts in north-central Mississippi are doing remarkably good work in harvesting legume seeds for cover crops and pasture. This is a real contribution to the Defense Program, because cover crops reduce the need for purchase of commercial nitrogen by the farmer. More nitrogen thus is available for munitions, and there is in addition a saving of transportation facilities in moving such fertilizer to the farms. Many southern farmers need to double and double again their present acreage of cover crops. They can do this most economically by growing their own seed. Many will not get it done and keep doing it unless they are doing it with home-grown seed.

By making their present pastures better and putting more badly eroded land into pasture, farmers not only will save soil, but will improve the food supply of the people on and off the farms in localities where too little meat and milk are now available. Such improvements in nutrition constitute a vital part of the Defense Program.

The following quantities of seed were harvested by cooperating farmers in the Holmes County and Montgomery County Districts this spring:

Kind of seed	Amount of seed harvested	Number of farmers harvesting
White Dutch clover (clean)....lb..	21, 175	19
White Dutch clover (uncleaned)....lb..	330	38
Hop clover (uncleaned)....lb..	960	11
Bur clover seed saved on own farms..bu..	154, 210	64
Bur clover seed saved on another farm..bu..	3, 790	72
Crimson clover....lb..	12, 060	7
Wild winter pea (*Lathyrus hirsutus*).lb..	6, 000	2
Austrian winter pea....lb..	300	1

WANTED: TECHNICAL ASSISTANCE ONLY

(*Continued from p. 79*)

argued. They did and he did. Now Jameson has some of the prettiest contour furrows anywhere and the new alfalfa-brome seeding is improving his old pasture of Canada bluegrass and quackgrass.

"It is not just the farmers who cooperate 100 percent," Rosencrans remarked. "The county highway people do, too. They have improved roads, seeding and sodding the roadside ditches, not only to handle normal run-off but to serve as terrace outlets."

As County Agent Hemstreet remarked, "Hungry cows trying to nip an existence from sunburned June grass pastures produce little butterfat and at high cost, compared to well-fed animals, knee deep in brome-alfalfa." That is why 600 farmers in the county planted alfalfa-brome last year alone; why, the year before, Grand Traverse County planted 6,000 acres of alfalfa-brome and more than 4,000 acres of other legumes and perennial grasses; why farmers used 66,329 pounds of 16-percent phosphate, 23,600 pounds of 50-percent potash, 164 tons of lime, and 4,000 cubic yards of marl.

These Michigan fruit growers have changed their pattern of planting and tilling. They once said that young fruit trees could not be started in sod and mulch. They clean tilled them—and had erosion. Now their young orchards, contoured, terraced, and green with sod, apparently are growing well. Old established orchards, which may stand for years, are kept covered with grasses, legumes, and mulch. All vegetable matter is disked into the soil because, like steel-reinforcing in concrete, organic matter binds the soil and gives it more moisture-holding capacity.

Farmers from neighboring counties have come to see what is going on in Grand Traverse. They are talking about forming soil-conservation districts. But Grand Traverse is a jump ahead of its neighbors: with their old project demonstrations to guide them, they already have voted in favor of organizing a district and are now developing their work program.

Less than 3 years ago these Grand Traverse fellows asked for and got the first Soil Conservation Service demonstration project in which only technical guidance was furnished by the Government. They have made good on their end. As Roy Hooper, chairman of the county agricultural planning committee, said:

"We're all good farmers at heart. We want to farm the right way. We want to know how—and this soil-conservation project is showing us."

SUGGESTIONS FOR PASTURE MIXTURES TO MEET VARYING CONDITIONS

I

Q.—I want to establish a soil-conserving, profitable pasture in the northeastern part of the United States. What type of mixture shall I use?

See the map for the five main pasture regions of the United States and subdivisions of these regions (dotted lines) indicating more definitely the conditions under which each of the tame grasses or legumes is useful in pastures.

Know the soil conditions of the field where the pasture is to be established or renovated. What may suit one farm or field may not suit the adjoining farm. The upper part of one field or pasture often requires different seed as well as fertilizing and tilling to prepare the seedbed. Hence the mixtures given here should be considered as guides and used where specific recommendations for local needs are not available.

Plant a mixture of several kinds of plants, especially grasses and legumes, for a permanent pasture.

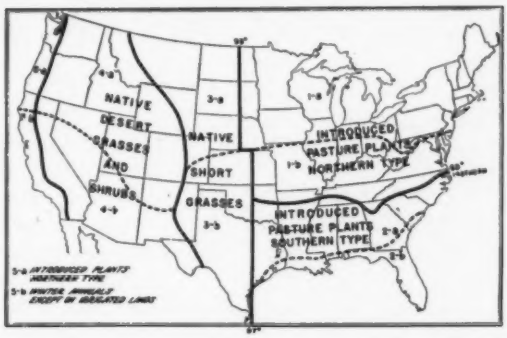
Northeastern States (section 1–a)

Mixture for good, well-drained soils:	Pounds per acre
Kentucky bluegrass	5 or 6
Orchard grass	4 or 5
Timothy	4 or 5
Redtop	2 or 3
Alsike clover	2
Red clover	2
White clover	1 or 2
Total	20 or 25

Mixture for poor, well-drained soils:	Pounds per acre
Orchard grass	8 or 10
Canada bluegrass	5 or 6
Redtop	4 or 5
Alsike clover	2 or 3
White clover	1
Total	20 or 25

In Iowa, Minnesota, and the Dakotas, bromegrass may be substituted for orchard grass in the above mixtures.

Mixture for wet, poorly drained soils:	Pounds per acre
Timothy	4 or 6
Redtop	8 or 10
Alsike clover	3 or 4
Total	15 or 20


NATIVE DESERT GRASSES AND SHRUBS
NATIVE SHORT GRASSES
INTRODUCED PASTURE PLANTS NORTHERN TYPE
INTRODUCED PASTURE PLANTS SOUTHERN TYPE

Mixture for extremely wet, poorly drained soils:	Pounds per acre
Reed canary grass	5 or 8
Redtop	4
Alsike clover	1 or 3
Total	10 or 15

On land likely to be submerged for a part of the year, reed canary grass may be sown alone at the rate of 8 to 12 pounds per acre. Excellent pasture may thus be obtained from land otherwise unproductive.

Northern Corn Belt

Mixture for short ley pasture (good, well-drained soils):	Pounds per acre
Alfalfa	10 to 12
Smooth bromegrass	6 to 8

Southern Corn Belt

Mixture for short ley pasture (good, well-drained soils):	Pounds per acre
Orchard grass	8 to 10
Korean lespedeza	15

Northeastern States

Mixture for short ley pasture:	Pounds per acre
Timothy:	
Fall seeding	5 to 6
Spring seeding	8 to 10
Ladino clover	2 to 4

Mixture for short ley pasture, more permanent seeding:	Pounds per acre
Alfalfa	6
Ladino clover	2

BOOK REVIEWS AND ABSTRACTS

by Phoebe O'Neall Faris

FIVE ACRES AND INDEPENDENCE—A PRACTICAL GUIDE TO THE SELECTION AND MANAGEMENT OF THE SMALL FARM. Revised and Enlarged Edition. By M. G. Kains. New York, 1940.

There are moments, in times such as these, when it is a tremendous relief to find a quiet small corner with only one's own small affairs for company. To many Americans this book provides the means for such relief. It is designed especially for people haunted by the small-country-home dream, yet it is nonetheless valuable to the established farmer, small or big, who knows that he should check the efficiency of his farm operations frequently and in detail. The meticulous care with which the author treats the details involved in intensive farming is most unusual and commendatory. As for soil conservation, every phase of it is here, from soils studies to farm planning, hillculture to agricultural engineering, plant propagation to the ecological relationships of soils and plants, climatic influences, tillage and fertility, and so on all along the road to successful farm business. The friendly, conversational tone of the book is one of its best features.

The author begins with a warning, by pointing out in no uncertain terms the "tried and true ways to fail" at intensive farming. He ends his book with appendices to the number of 46, compiled as ready helps to farmers looking for tested and approved methods of choosing, setting out, growing and harvesting a great variety of plants; retaining soil fertility; controlling pests; drainage needs and installation; fertilizer mixtures; cisterns, weirs, tools, septic tanks; run-off and erosion check-ups; cold storage. In between the "warnings" and the "helps" are 46 chapters dealing with practically every phase of farming the small farm for profit.

In books for actual use as "tools," especially in farming, one wants proved and up-to-date facts and not fish stories. One excellent way of checking the accuracy of such books is to check the author's experience and connections. M. G. Kains has been a farmer all his life, on many different farms and under varied conditions. He is likewise a horticulturist of note and has had wide experience as editor of horticultural, agricultural, and botanical writings. He is the author of other books on plant propagation, herb growing, and garden plants. He is, at present, special crop culturist for the United States Department of Agriculture.

As a test of thoroughness, I have gone through this book several times, each time with a different problem in mind. For example, this question came to mind: What are the points I should consider in choosing a small farm if it is my purpose to go into market gardening? Before I knew it I had more than 50 items, all of them important to the objective—and all classifiable under one heading or another of soil-conservation and land-management objectives, if one wanted to go more deeply into the analysis.

Other queries can be answered similarly and in even more detail: What are the precise directions for building up and maintaining soil fertility while using continuously every acre of the small farm for cash production? What about water supply, drainage, sewage, frost damage prevention, weeds, tools, fertilizers? Suppose I need coldframes and hotbeds? A greenhouse? Can I keep any live stock other than poultry and bees? Since green-manure and cover crops are essential for improvement of the soil, how shall I determine the legume, or the mixture, best adapted to my soil and slope and climatic conditions? What cropping systems shall I use to avoid "sick soil?"

Suppose, then, that you have selected your small farm and have planned your soils management and tillage, and you know quite well your income needs. There may be a neglected orchard—in this book you will find several chapters on remaking such an orchard, fruit tree pruning, grafting, and the growing of new trees from nursery stock. Your vegetable crops, or your strawberries, or your bush fruits or grapes, or all of them—"something to sell every day"—will constitute your gardening-for-money objective. Mr. Kains offers you 11 chapters for constant use, once the go-ahead sign has been turned on. The first is about vegetable crops to avoid and to choose; then come most meticulous directions for seeds and seeding, transplanting, how to grow plants for sale and sell them, strawberry culture, bush and cane fruits, growing grapes for market, orcharding, storage of fruits and vegetables, and spraying and dusting.

There are about a hundred drawings, covering everything from indoor and outdoor fruit and vegetable storage systems to a diagram showing losses of lime through different crops and drainage.

CALIFORNIA FARM HANDBOOK 1941. Compiled by the U. S. Department of Agriculture and the University of California. Superintendent of Documents, Washington, D. C. 1941.

This handbook and 47 more like it, one for each State—and perhaps three more, one for Alaska, one for Hawaii, one for Puerto Rico—would make a valuable reference for almost everybody in the country. The California Farm Handbook makes a good start and a good model.

Probably it would be difficult to find a farmer, a State or Federal agricultural worker, a city businessman or an industrialist, who does not need to know at one time or another, or many times within a year, where he can go for accurate information on the availability of information having to do with one or more of the public services available to agriculture within his own or some other State. This 114-page book, perforated and ready to hang on the wall, is going to save a great deal of time for California farmers.

The handbook is as completely up-to-date as is possible in these rapidly changing times. It tells the user where to go for information on agriculture in defense, including such subjects as the food situation at home and abroad and the outlook for increasing production of certain food crops, the best soil-conservation methods for wartime production, farm labor needs, registration for skilled work in defense industries, financial assistance, agriculture educational facilities, debt adjustment—and more than a hundred other problems from general programs to the details of actual farming processes and methods.

U. S. GOVERNMENT PRINTING OFFICE: 1941

For REFERENCE

Compiled by ETTA G. ROGERS, Publications Unit

Field offices should submit requests on Form SCS-37, in accordance with the instructions on the reverse side of the form. Others should address the office of issue.

Office of Information
U. S. Department of Agriculture

California Farm Handbook, 1941: Public Services Available to Agriculture. U. S. Department of Agriculture in cooperation with the University of California.

Dry Land Crops at the Dalhart (Tex.) Field Station. Circular No. 564. Bureau of Plant Industry. November 1940. 15¢.[1]

Erosion and Related Land Use Conditions on the Chehalem Mountain Demonstration Project, Oregon. Erosion Survey No. 20. Soil Conservation Service. May 1941. 20¢.[1]

Erosion and Related Land Use Conditions on the Presque Isle Demonstration Project, Maine. Erosion Survey No. 19. Soil Conservation Service. April 1941. 20¢.[1]

La Conservación del Suelo en Puerto Rico (Soil Conservation in Puerto Rico). Soil Conservation Service. 1941.

Metodos Modernos Para Conservación de Suelos en Puerto Rico (Modern Methods for Soil Conservation in Puerto Rico). Spanish edition July 1940 Soil Conservation. Soil Conservation Service. 1941.

North Carolina Farm Handbook, 1941: State and Federal Agricultural Services. U. S. Department of Agriculture in cooperation with the Extension Service, North Carolina College of Agriculture and Engineering.

Restoring Conifers to Aspen Lands in the Lake States. Technical Bulletin No. 763. Forest Service. March 1941. 10¢.[1]

Wireworms and their Control on Irrigated Lands. Farmers' Bulletin No. 1866. Bureau of Entomology and Plant Quarantine. March 1941. 10¢.[1]

Miscellaneous Federal Bulletins

Effective Operations of the Soil Conservation Districts. (A Group of Papers Presented at the meeting of the Soil Conservation Section, Association of Southern Agricultural Workers, Atlanta, Ga., February 6, 1941.) Soil Conservation Service. mm.

Farmers Face Farm-Management Facts in Ward County (North Dakota). Bureau of Agricultural Economics in cooperation with the North Dakota Extension Service. February 1941. mm.

Land-Use Adjustment in the Buffalo Creek Grazing District, Yellowstone County, Montana. Bureau of Agricultural Economics. August 1940. mm.

Planning Farms for Stability in Boone County, Nebraska. Bureau of Agricultural Economics in cooperation with the Nebraska Experiment Station. April 1941. mm.

Research in Interregional Competition. Bureau of Agricultural Economics. April 1941. mm.

Results of Range Studies. Pamphlet No. 3. Tri-County Soil Conservation District, Faith, South Dakota, with the cooperation of the Soil Conservation Service. March 1941. mm.

Results of Range Studies. Pamphlet No. 4. Tri-County Soil Conservation District, Faith, South Dakota, with the cooperation of the Soil Conservation Service. June 1941. mm.

The Sargent County Farmer Looks Forward in his Adjustment Problems. Bureau of Agricultural Economics in cooperation with North Dakota Extension Service. February 1941. mm.

Agricultural Experiment Stations

Conservation of Massachusetts Soils. Leaflet No. 193. Extension Service, Massachusetts State College, Amherst, Mass. March 1941.

Conserving Land and Water Resources. Florida State Planning Board, Tallahassee, Fla. January 1941.

Factors Influencing Alabama Agriculture: Its Characteristics and Farming Areas. Bulletin No. 230. Agricultural Experiment Station, Alabama Polytechnic Institute, Auburn, Ala., with the cooperation of the Bureau of Agricultural Economics, U. S. Department of Agriculture. April 1941.

Farm Management for Soil Conservation in the Harrison Area. Bulletin No. 301. West Virginia Agricultural Experiment Station, Morgantown, W. Va., in cooperation with the Bureau of Agricultural Economics and the Soil Conservation Service, U. S. Department of Agriculture. May 1941.

Farm Weir for Measuring Irrigation Water. Extension Circular No. 759. Extension Service, University of Nebraska Agricultural College, Lincoln, Nebr. February 1941. mm.

Farmer Cooperation in Northern Alabama: A Physical Inventory and Appraisal of Cooperative Endeavor in Sixteen Counties. Bulletin No. 249. Agricultural Experiment Station, Alabama Polytechnic Institute, Auburn, Ala., in cooperation with the Tennessee Valley Authority. March 1941.

Ladino Clover. Circular No. 408. Agricultural Experiment Station, Rutgers University, New Brunswick, N. J. January 1941.

The Mesa Experiment Farm Helps Farmers Help Themselves. Bulletin No. 171. Agricultural Experiment Station, University of Arizona, Tucson, Ariz. February 1941.

Nebraska Pastures: Seeding and Management. Circular No. 67. Agricultural Experiment Station, University of Nebraska, Lincoln, Nebr. February 1941.

Planning Minimum Sized Ranches and Farms for the Hyde County Area in South Dakota. Bulletin No. 346. Agricultural Experiment Station, South Dakota State College, Brookings, S. Dak., in cooperation with the Bureau of Agricultural Economics, U. S. Department of Agriculture. December 1940.

Soybeans in New Hampshire. Circular No. 57. Agricultural Experiment Station, University of New Hampshire, Durham, N. H. January 1941.

Strip Cropping to Control Erosion. Circular No. 317. Extension Service, University of Wisconsin, Madison, Wis. March 1941.

Study of Land Utilization in Providence County, Rhode Island. Bulletin No. 275. Agricultural Experiment Station, Rhode Island State College, Kingston, R. I. 1940.

Waterworks for Texas Farm Houses. B-67. Extension Service, Texas Agricultural and Mechanical College, College Station, Tex. 1940.

Why is Subsoil Unproductive? Bulletin No. 464 Colorado Experiment Station, Colorado State College, Fort Collins, Colo. February 1941.

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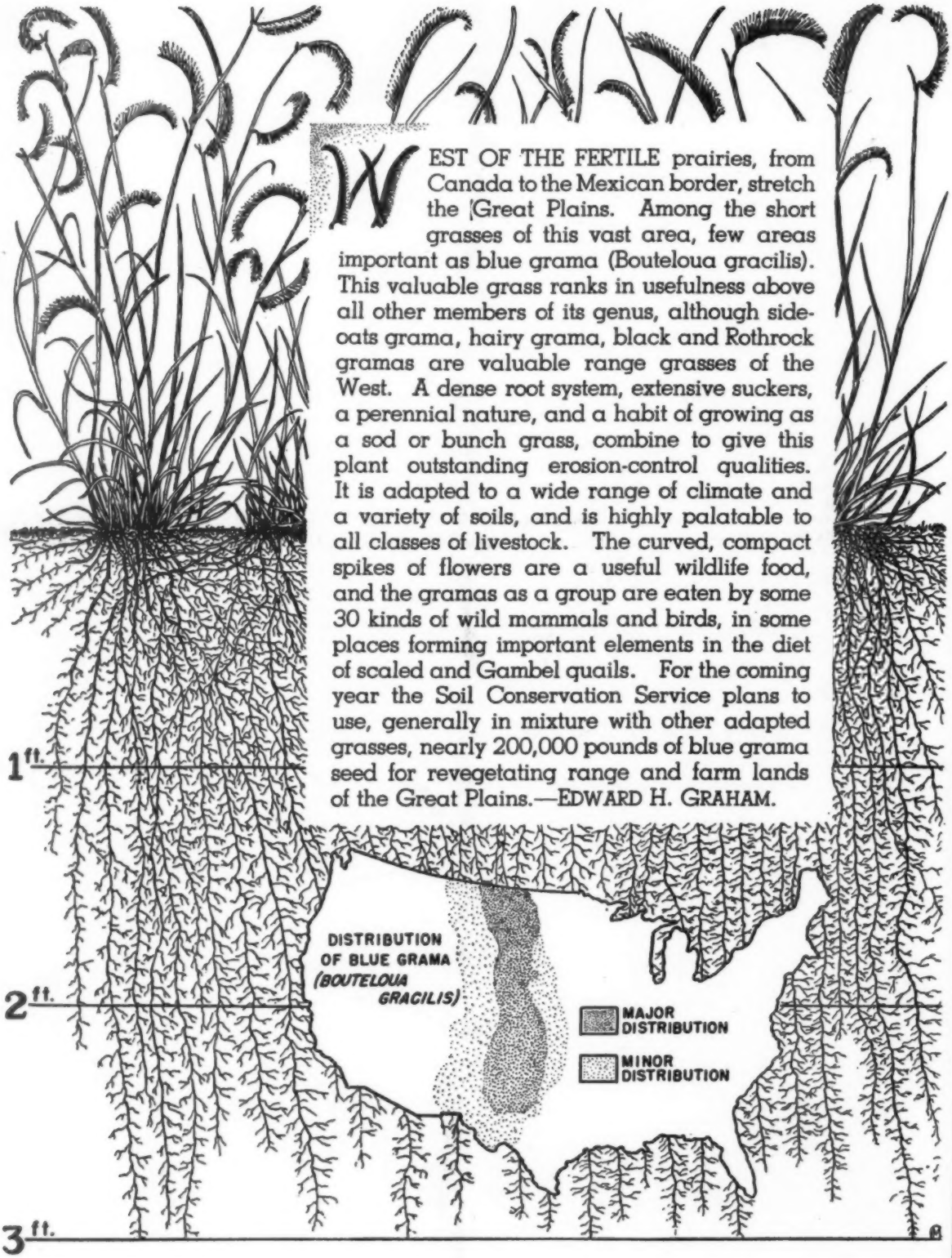
[1] From Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.



WEST OF THE FERTILE prairies, from Canada to the Mexican border, stretch the Great Plains. Among the short grasses of this vast area, few areas important as blue grama (Bouteloua gracilis). This valuable grass ranks in usefulness above all other members of its genus, although side-oats grama, hairy grama, black and Rothrock gramas are valuable range grasses of the West. A dense root system, extensive suckers, a perennial nature, and a habit of growing as a sod or bunch grass, combine to give this plant outstanding erosion-control qualities. It is adapted to a wide range of climate and a variety of soils, and is highly palatable to all classes of livestock. The curved, compact spikes of flowers are a useful wildlife food, and the gramas as a group are eaten by some 30 kinds of wild mammals and birds, in some places forming important elements in the diet of scaled and Gambel quails. For the coming year the Soil Conservation Service plans to use, generally in mixture with other adapted grasses, nearly 200,000 pounds of blue grama seed for revegetating range and farm lands of the Great Plains.—EDWARD H. GRAHAM.